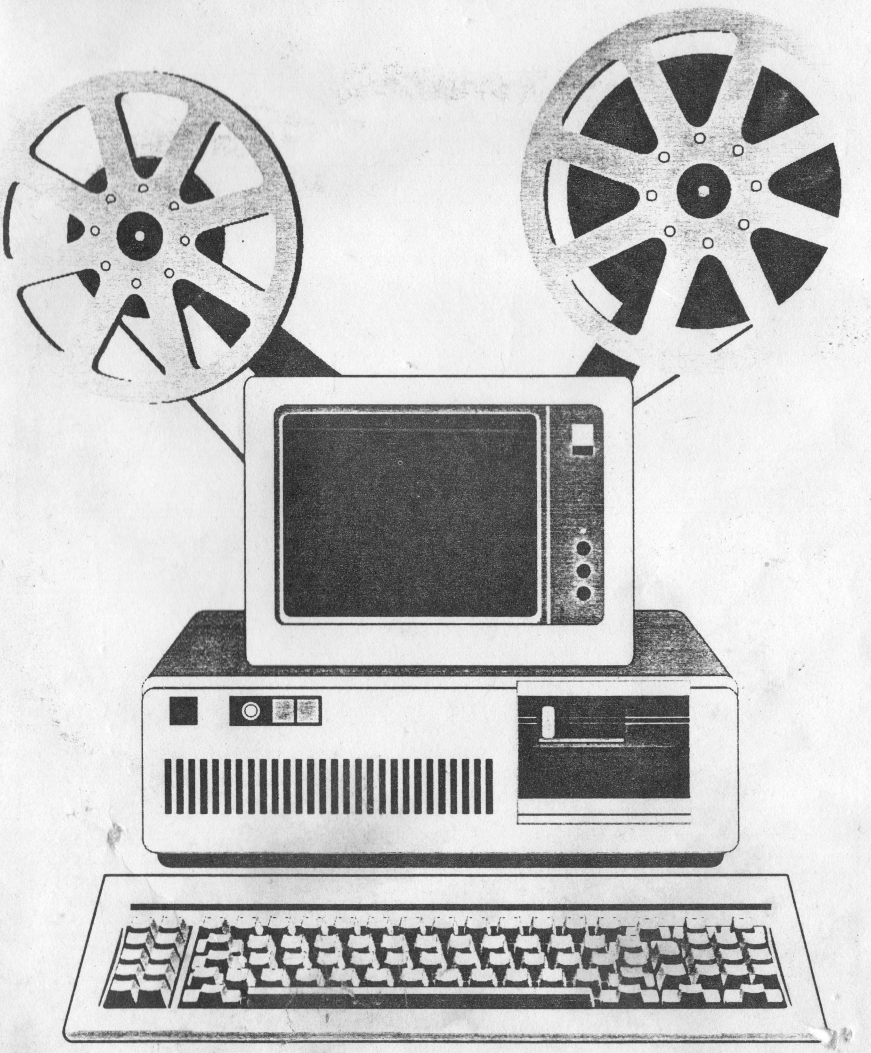
multimedia research

MR RamGrab/AT

Operation Manual



DISPLAY RESEARCH LABORATORY

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1. Welcome to MR RamGrab/AT

1.1 What is MR RamGrab/AT

MR RamGrab/AT is a colour digital video system for the AT Compatibles. It captures video from a wide range of video source such as TV, monitor, camera, video cassette recorder or LaserDisc Player, and convert them to digital data. You can save this data to your hard disk in a number of popular file formats such as PCX, GIF, TIFF and TARGA. You can also save it as PPF File format documented in this manual.

Besides capturing individual frames to the hard disk, you can also capture a series of frames to the hard disk as a movie clip. This allows you to convey more information using motion pictures instead of a still frames. You can now use a floppy disk to hold your favourite movie clips.

The software provided allows you to capture frames in different scales and different sizes. You can capture your frames in a specially dithered pattern which gives high quality 8-bit colour. 256 levels Grayscale is also given for better printout. You can also save your frames in True Colours (16-bit or 24-bit) for DTP and multimedia presentation.

1.2 System Requirements

- 286 AT Compatibles computer, preferably 386
- VGA display card with at least 512k RAM
- DOS version 3.3 or higher
- Windows 3.0 for Windows version capturing application

2. Installing MR RamGrab/AT

2.1 Hardware Installation

1. Turn off your computer.
2. Open the system casing.
3. Plug in MR RamGrab/AT into a 16-bit expansion slot of your computer. Secure the metal bracket at the tail of the grabber card with a screw.
4. Close the system casing and make sure every connection is solid in place.
5. Connect the video output of your video source to the composite and/or S-Video input of the Grabber.
6. Turn on your computer and start to install the software to your computer.

2.2 Software Installation

1. Make a backup copy of your original diskette before the installation. (See DISKCOPY command in your DOS manual)
2. Create a directory caller MRRG and copy all the contents of the disk to your hard disk including the sub-directories.

3. Compatibility Driver RGDRV.EXE

You should run the compatibility driver before you use the software MRRG.EXE and the Windows Version. Type 'RGDRV' and press Enter to load the driver. A message 'Driver Installed' will be displayed when the driver is successfully loaded. Otherwise an error message will be displayed. If you encountered such problem, please contact your dealer for more information.

4. Using the Software MRRG.EXE

4.1 Quick Start

This section tells you how to capture frames, make movies in simple steps. Continue to read the following sections to get more detail information.

4.1.1 To capture a single frame

1. Type 'MRRG' to launch the program.
2. Click the SHOT button when you want to capture that particular frame.
3. Type in the name of the file and click OK to save the frame.

4.1.2 To view a saved frame

1. Type 'MRRG' to launch the program.
2. Choose OPEN from the FILE menu.
3. Choose the correct directory, file name and file format.
4. Click OK to load the picture.

4.1.3 To make a movie

1. Type 'MRRG' to launch the program.
2. Click the REC button and type in the file name, then click OK
3. Click START to initialize continuous capture.

4.1.4 To play a movie

1. Type 'MRRG' to launch the program.
2. Choose PLAY MOVIE from the FILE menu.
3. Choose the correct directory and file name.
4. Click PLAY to play the movie.

4.2 Using MRRG.EXE

4.2.1 User Instructions

MRRG is a program which allows you to view live video, fine-tune the colour, capture individual frames and movie clips to the hard disk. You can also select different video sources, standards, capture modes, load saved frames and play movie clip using the same software. This program runs on normal DOS system and have no restriction on the memory size of the computer.

On starting the program, it will first scan the composite source to check the presence of video. If no video is detected, it will turn to the S-Video port.

If no video is detected for both inputs, warning will be given and the programs terminates. If video is detected in either source, the video standard is then determined automatically.

It is recommended to use a mouse in running the program although keyboard can also be used. Use arrow keys to move the cursor and return to select options and click buttons.

4.2.2 Input Options

You can use the following options in selecting the hardware characteristics of MR RamGrab/AT on starting up.

options:

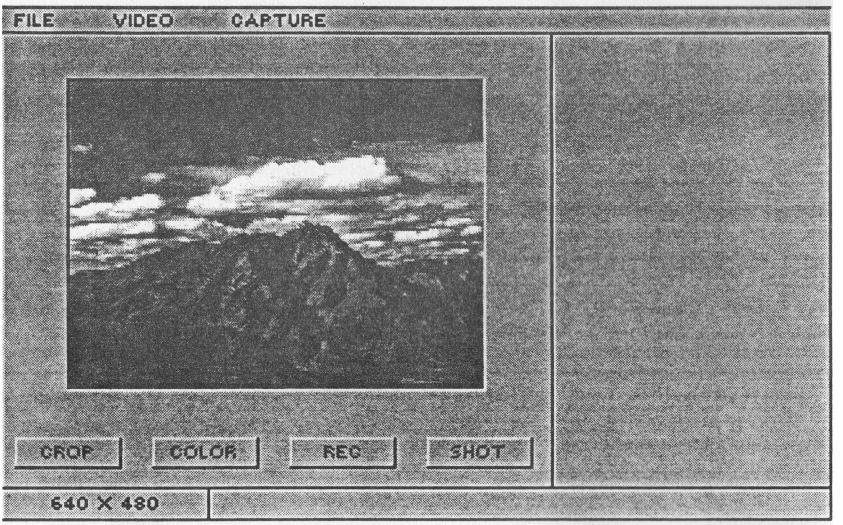
/p:n This specify the port base address of MR RamGrab/AT which depends on the current jumper setting. The default setting is 3E0h (See Sections on jumper setting). n takes a value of 0 to 3 where 0 stands for 320h, 1 stands for 370h, 2 stands for 390h and 3 stands for 3E0h.

/v:vmode This specify the VGA Chips chosen for loading and playing files. Loading and playing usually use SuperVGA mode i.e. 640x480. Normally, the program will detect the VGA chips automatically. However, if the program has problem in find the correct one, you may use this option to force the program to the correct one.

Examples: MRRG /p:3 /v:a will choose port base 3E0h and VGA mode 320x200.

4.2.3 Program Interface

After the program has started, the following screen appears.



On the top of the screen is the menu bar which contains various options for selecting different sources, standard, capture modes etc.

Live video preview is present on the centre of the screen.

There are 4 buttons located under the preview screen. These buttons are used for capturing individual frames and movie, tuning colour and cropping the video.

At the bottom of the screen, there are two bars. The bar on the left is the size information bar. It displays the current capturing size in pixels. The first integer gives the width while the second one gives the height. The bar on the right is the general information or the process bar. It displays information of process such as saving, loading and display the current state of the process.

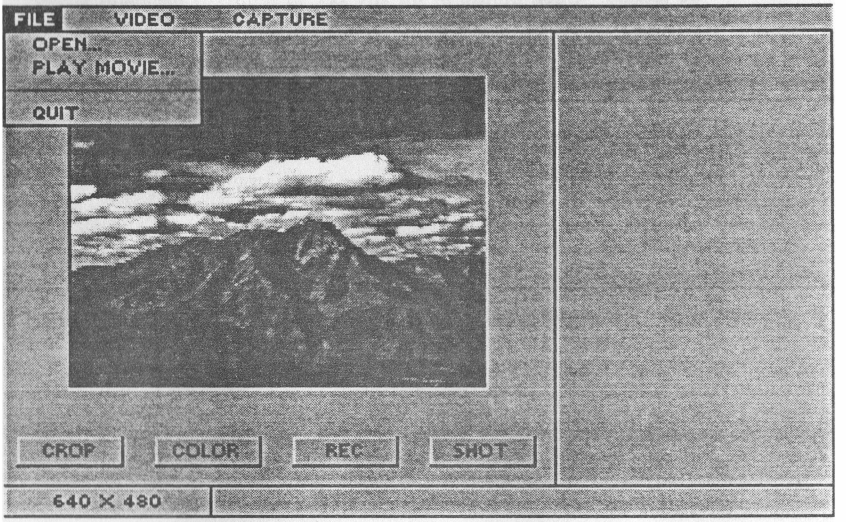
4.2.4 Menu Options

There are three menu items, namely FILE, VIDEO and CAPTURE.

4.2.4.1 MENU FILE

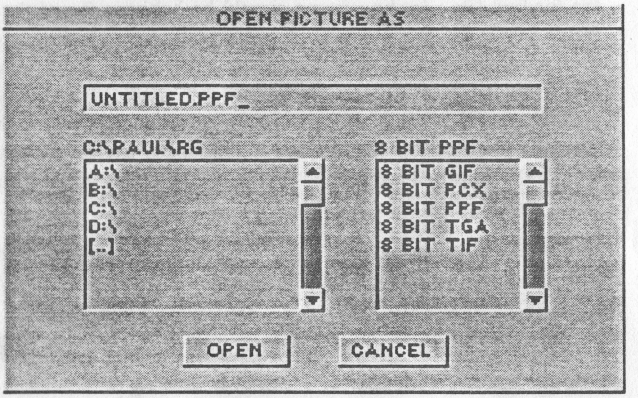
This menu option contains items for loading and playing frames.

There are 3 options in FILE menu.



OPTION OPEN

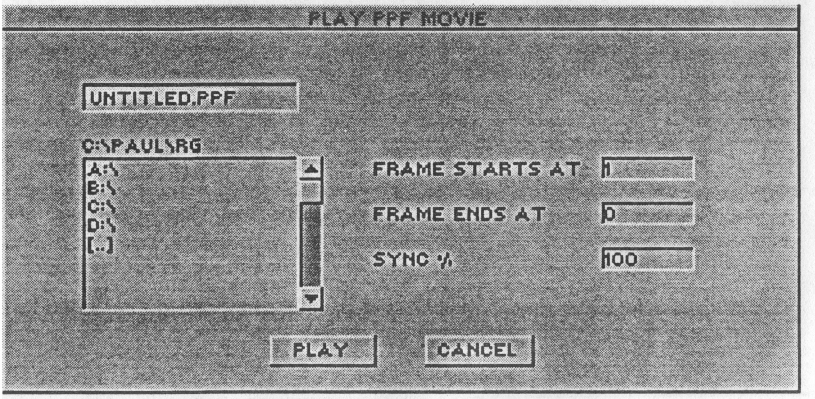
Option OPEN allows you to view a saved frame. On choosing this options, the following dialog box is present.



Select the correct drive, directory and file name by clicking on the items. The current path is displayed in blue on top of the directory edit box. The file format can be selected by a single click on the item in the file format edit box. The selected file format is displayed in blue on the top of the edit box. You can also type in the name of the file directly. If you does not specify the extension, it will be added for you. Click button OPEN to load the file or CANCEL to withdraw the option. After the file will be loaded. Click mouse or hit any key to return to the main screen.

OPTION PLAY MOVIE

Choose this option to play a captured movie clip. On selecting this option, the following dialog box is displayed.



Select file as described before in option OPEN. You can also specify the starting frame number and the ending frame number. Starting frame number should be between 1 and the maximum number of frames actually inside the loading file. Ending frame should be between 0 and the number of frame inside the loading file. A value of 0 in the ending frame number means use the last frame number of the loading file. You can also control the speed of playback of the movie by varying the synchronisation percentage. A value of 100 means the program will adjust the speed of playback to be almost the same as the capturing speed. Values of smaller than 100 will play back movies faster while values greater than 100 will make movie playback slower.

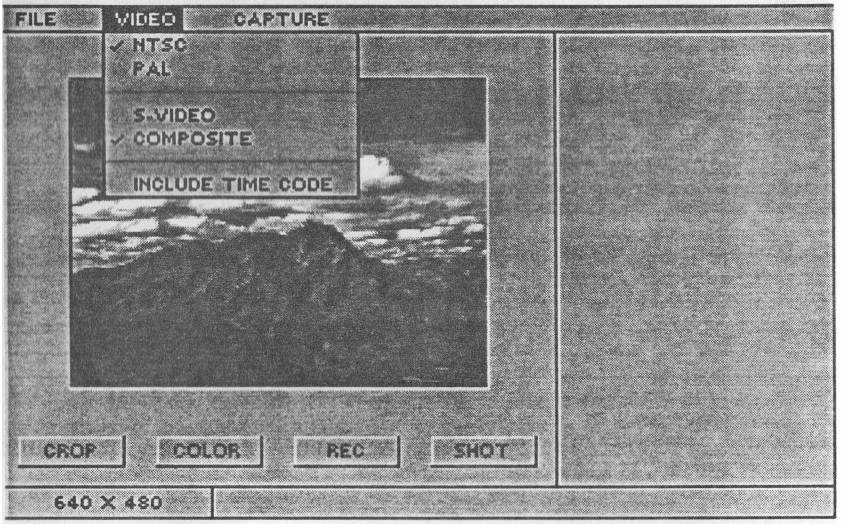
Notice that you can specify frame start to be greater than frame end. In such case, the movie will play in reverse.

OPTION QUIT

Choose this option to permanently terminate the program and return to DOS shell.

4.2.4.2 MENU VIDEO

This menu option contains items for selecting different video source and standards.



OPTIONS NTSC/PAL

Choose among the two video standard format by these options. NTSC stands for National Television Standards Committee while PAL stands for Phase Alternate Line. Normally, the video standard is detected automatically on starting up and every time you change the video source. Use this option only when you find that the detection is incorrect.

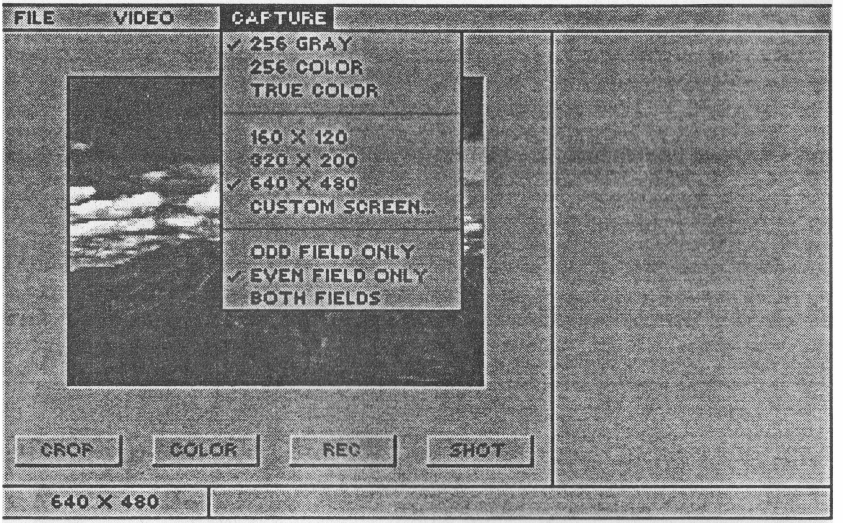
OPTIONS S-Video/Composite

Switch between the two input sources by these options. If the selected source contains no video, warning will be given and the operation is aborted and the program will use the previously selected source.

OPTION INCLUDE TIME CODE

This option allows you to select whether you want to capture time code information located above the video image. Time code is located outside the visible region of a normal TV.

4.2.4.3 MENU CAPTURE



This menu option allows you to choose different capture methods.

OPTION 256 Gray
Choose this option to select the 256 Gray level capture mode. This mode provides image captured for image processing and is the best quality when output to Laser Printer.

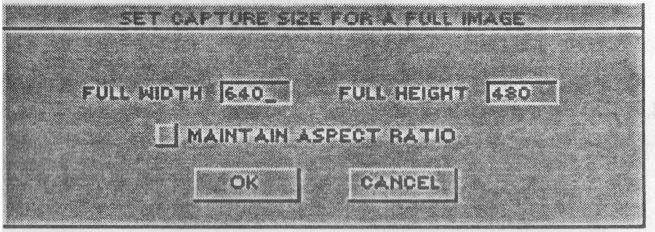
OPTION 256 Colour
This is a specially designed rendering of a real-life image to 256 colours. It provides the best quality in 8-bit colour. Choose this option to save disk space and for animation capture.

OPTION True Colour
This colour mode allows you to save frame as a true colour image i.e. 16-bit or 24-bit per pixel. You can use such image for DTP. Notice, this option is only effective for capturing only, not the previewing, so the screen preview will not change. (therefore if the previous chosen one is 256 Gray, and the user have chosen True Colour, the preview image is still in Gray but on capturing, it will be True Colour).

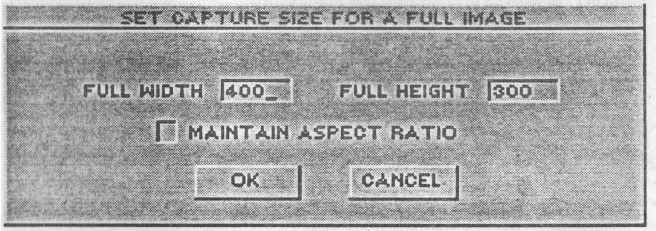
OPTIONS 160x120 / 320x200 / 640x480
These options provide several default sizes for capturing. 160x120 is recommended for continuous capturing which provides a faster frame rate. 320x200 is the default size for standard 256 colour VGA. 640x480 is the default size for 256 colours SuperVGA mode.

OPTION Custom Screen...

Choose this option to change the full image size for capturing. When this item is selected, the following dialog box is present.



Select the edit box by a single clicking and blinking a underscore will appear in that box. Then type in the number you want. This size is the actual size for all video regardless of the current cropping size. So if you have used the crop tool to select a portion for saving, the actual size of capturing will be reduced accordingly. Remember that this specify the full video image size for capturing. You can select maintain aspect ratio and the ratio of width to height will be set as 4:3 automatically.



The maximum value for the width and height depends on the current video standard and whether time code is included.

for PAL with time coding 720x620;

for PAL without time coding 704x576;

for NTSC with time coding 720x520;

for NTSC without time coding 704x480;

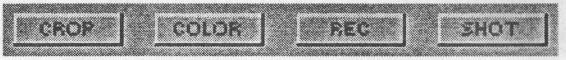
Click OK to accept the new setting or cancel to withdraw the option

OPTIONS ODD FIELD ONLY/EVEN FIELD ONLY/BOTH FIELDS

These options allows you to choose between different fields or frame capturing. Single field capture ensures that motion video can be captured without the problem of misalignment of the 2 fields. Frame capture (i.e. capture both field) can have higher resolution but is recommended to be used for still or slowly moving video.

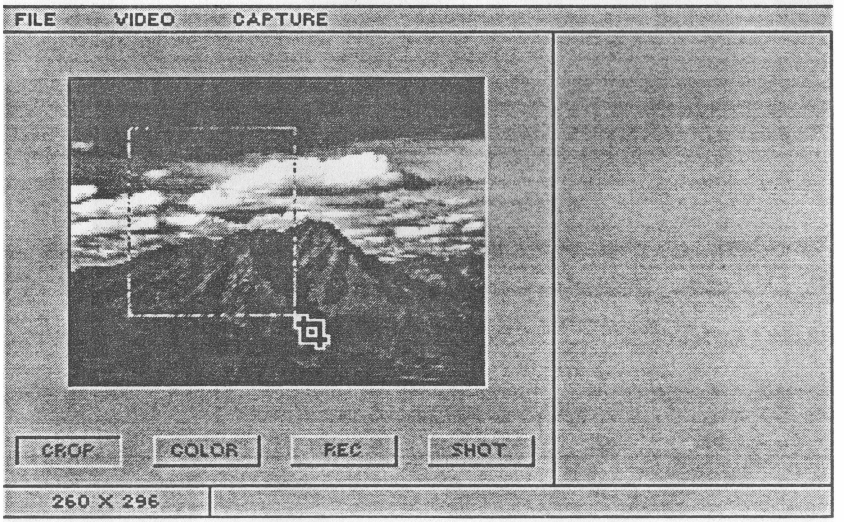
4.2.5 On-Screen Buttons

There are 4 buttons located under the preview screen.

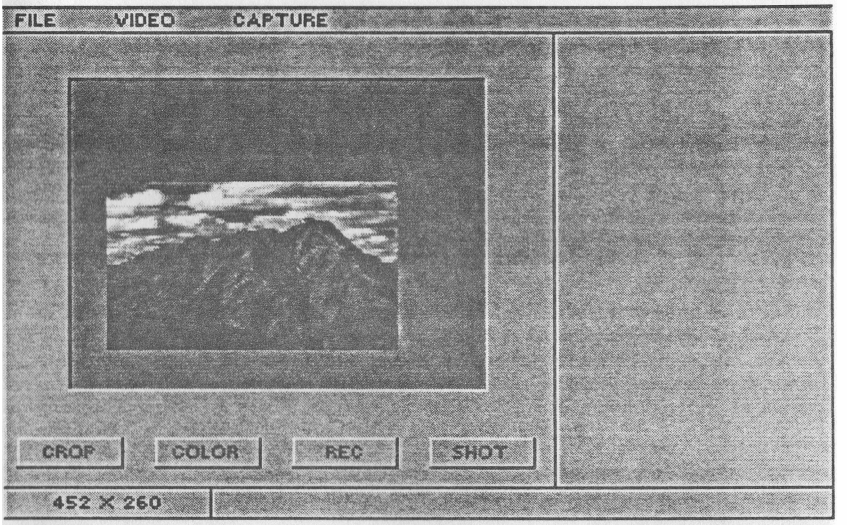


BUTTON CROP

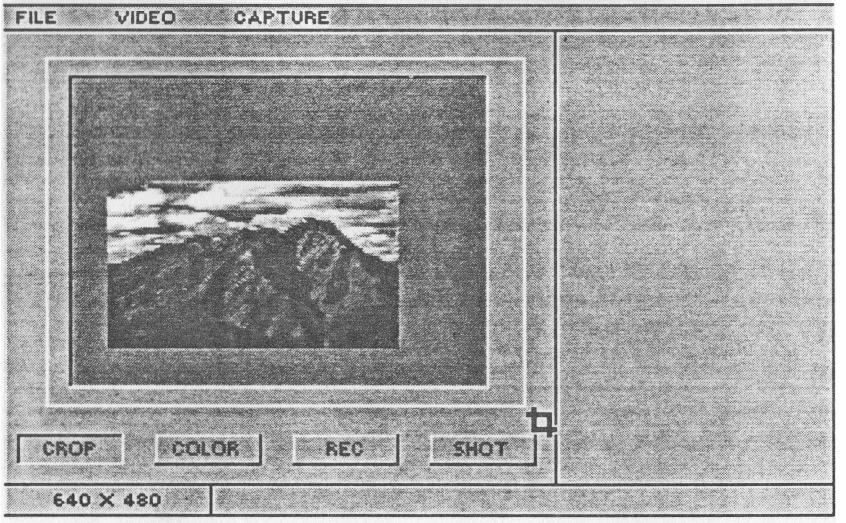
This button allows you select a portion of the screen as the capturing area. On clicking the button, the cursor will be change to a small rectangle. The first click allows you to select the starting point. Drag the mouse around to select the desired size. The current size can be seen on the size information bar.



A second one confirms the ending point.

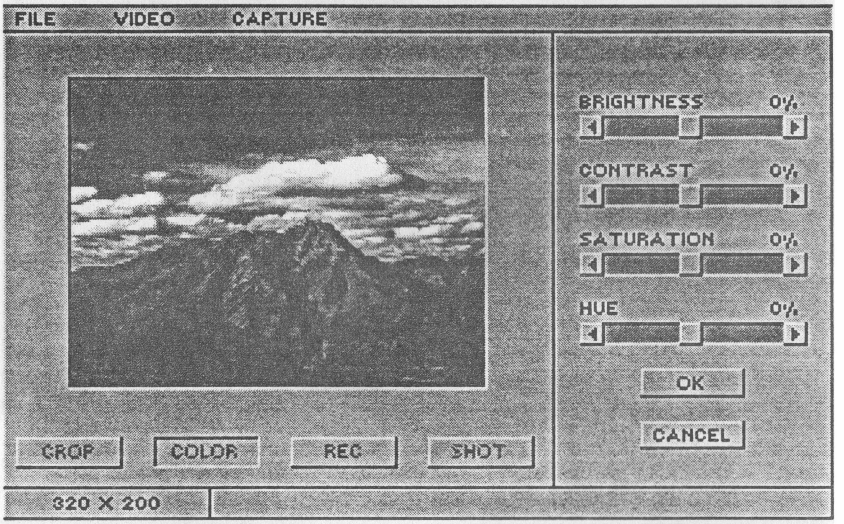


You can even start selecting the region outside the preview screen area. The program will automatically adjust the selected region to the preview area.



BUTTON COLOR

This button allows you to fine tuning the colour setting of the video image before capturing. After the button is clicked, the number of scroll bars will appear on the right of the main screen.

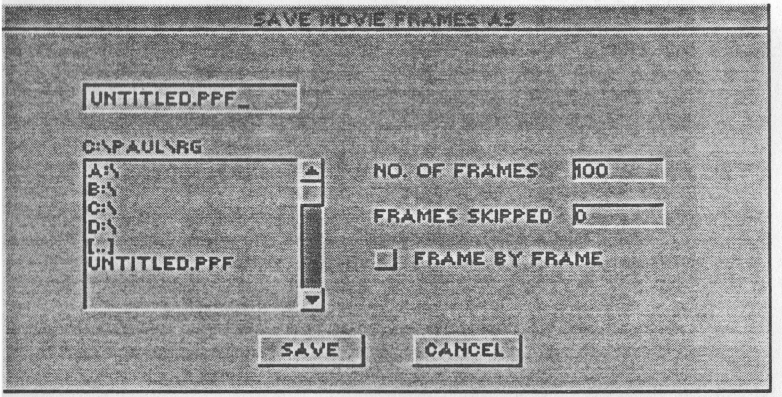


Drag the thumb or click on the arrows to change the setting, the preview image colour will also change to reflect the new settings. For all Settings, values range from -100% to 100% with 0% as the norminal value.

Click OK to accept the new setting or CANCEL to withdraw the option.

BUTTON REC

This button allows continuous capture to the hard disk. Only 256 Gray or 256 Colour can have continuous capture. If True Colour recording is attempted, warning will be given. On clicking the button, file name will be prompt and the following dialog box is displayed.



Select directory and file name as described earlier. The number of frames to be continuously captured can be modified by first selecting the edit box (click the box until you see a blinking underscore appears in the box). Then type in the numbers. Frames Skipped is the number of frames skipped inside hardware. Zero frame skipped makes the grabber to capture at its fastest speed, all frames will be taken if possible. The larger the frame skipped value, the lesser number of frames will be captured in a second. Notice that the image capture size has a direct effect on the frame skipped. If you are capturing a small image size, a frame skipped value of 0 is alright. But if you capture a frame in larger size such as 640x480, frame skipped value of 0 will bring tearing to a frame. This is because the transferring of data of one frame to the hard disk is much longer than a video frame, so saving a larger frame actually need time of two or more frames when frame skipped is zero. In such cases, set frame skipped to a larger value to ensure the capture frame is the same one. As a reference, the following values are suggested when you are capturing to a fast hard disk or ram drive.

for size 160x120, frame skipped can be zero

for size 320x200, frame skipped can be one or two

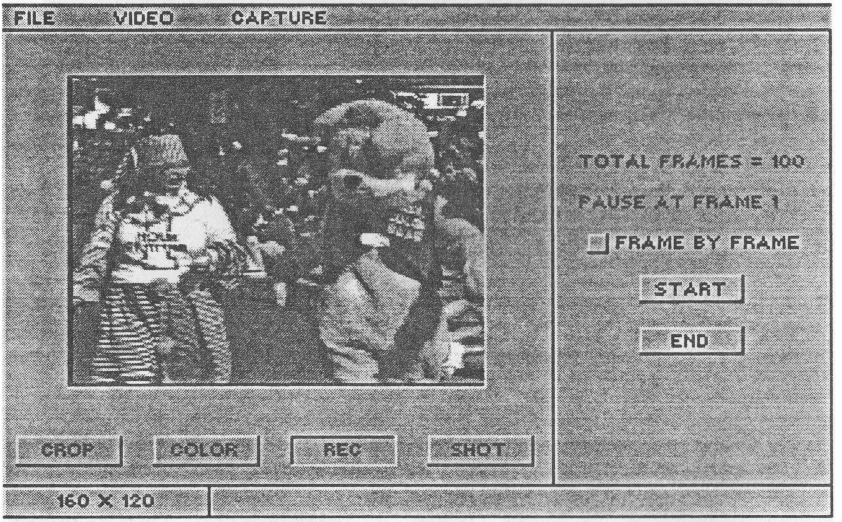
for size 640x480, frame skipped can be five or six.

The actual values may be different for different CPU or hard disk, you should try several times to find the most suitable values for your machine at that size.

You can save the movie frame by frame by checking the FRAME BY FRAME box. This allows you to create special effect and make object animation very easily.

Finally, click SAVE to proceed or Cancel to abort the process.

If SAVE is clicked, the following screen will appear.

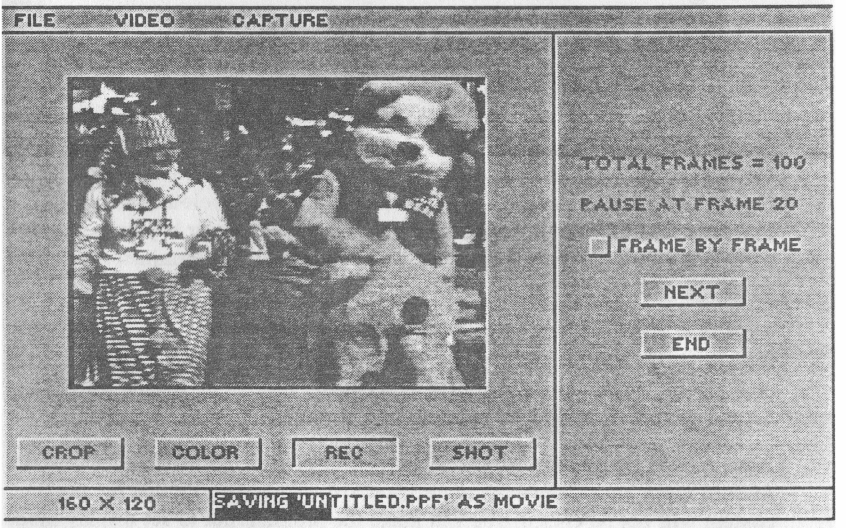


The capture process will not start unless you have clicked the Start button. This allows you to prepare the video frame you want to capture. Click Start to initial capture or END to end capturing.

The capture process will continue until either one of the following occurs:

1. All specified number of frames have been captured.
2. The storage media is full. In such case, the process is terminated and the remaining unsaved frame is discarded. However, the movie file is still usable but may not contain all the specified frames.
3. User has clicked the mouse button or hit Return.

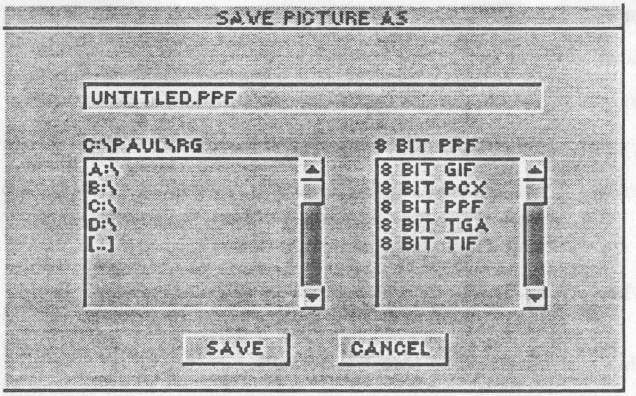
In case 3, the process is terminate temporary and the following screen appears.



Click Manual Saving to switch the auto or manual saving or NEXT to resume the process or END to end the process.

BUTTON SHOT

This button allows a single frame capture. The size, portions, colour mode etc. depends on the current setting. On clicking the button, the following dialog box appears.



Choose directory and file name as described earlier and click SAVE to the frame or Cancel to abort the process.

5. Using MR RamGrab DOS Utilities

5.1 Loading PPF Files (LOADPPF.EXE)

The program lOADPPF.EXE will load a PPF File in Super VGA mode (640x480x256 colours). Besides PPF, it also reads PCX version 3.0 files. You can use this program to view your saved file and make some simple slide show. Notice that the program only reads file with dimension not greater than 640x480. If you view a file in standard VGA mode (320x200x256 colours) and if the file is greater than the current screen size, you can use the cursor key to move other parts into view. After a file is displayed, the program will terminate only if the space bar or ESC has been pressed.

More than one file can be specified to the program for a continuous slide show. If no time constrain (option /w) has been given, the program will advance to the next picture whenever the space bar is pressed. You can terminate the process by pressing the ESC key at any time.

Also, you can run the program several times to display picture at different locations so as to make your slide show more attractive. To make sure that the previous content will not be erased, you can make the program not to set display mode and clear screen using options /d and /c respectively. However, if you use the option /d, you must specify the type of VGA card to the program using the option /v since no automatic detection of VGA type will be done in this case.

Type LOADPPF /h to get more help.

The following are the options used in this program.

Usage: LOADPPF [/option [/option...]] filename [filename]

Example: LOADPPF /d /v:c frame1.ppf frame2.pcx

options:

/x:pos - Set the picture upper-left x-coordinate to this position

/y:pos - Set the picture upper-left y-coordinate to this position

/w:n - Makes the program to wait n number of 1/100th seconds before loading the next picture. If this option is missing, the program will wait for the pressing of the space bar.

/l:n - Loop the displaying picture n number of times. If only /l is given, the program will loop until an ESC key is pressed.

/d - do not set Video BIOS mode

/c - do not clear screen after termination

/p - do not modify the current palette, in other words, do not load the picture palette.

/h - display this help message.

/v:m - select your VGA card chip set. The program normally will automatically detect your VGA type, but if there is any problem, try using this option to force the VGA mode or use the standard VGA mode.

Notice that if no extension is given for the filename, it is assume to be an PPF file. The program will append the extension '.ppf' to the file name before opening the file.

5.2 Playing Back (PLAYPPF.EXE)

The program PLAYPPF.EXE will play back a continuous capture file saved in PPF file format. It will play the animation file in SuperVGA mode. The maximum size of playing back is also the 64000 bytes limits.

Similar to LOADPPF.EXE, you can specify more than one file to the program and use specific options to play files in different location.

The followings are the options used in this program.

Usage: PLAYPPF [/option [/option]] filename [filename]

Example: PLAYPPF /w:5 /l movie1.ppf movie2

options:

/x:pos - Set the picture upper-left x-coordinate to this position.

/y:pos - Set the picture upper-left y-coordinate to this position.

/w:n - Makes the program to wait n number of 1/100th seconds before loading the next picture. If this option is missing, the program will wait for the space bar.

/l:n - Loop the displaying picture n number of times. If only /L is given, the program will loop until an ESC key is pressed.

/d - do not set Video BIOS mode

/c - do not clear screen after termination.

/p - do not modify the current palette, in other words, do not load the picture palette.

/h - display this help message.

/fs:n - set the starting frame number to n

/fe:n - set the ending frame number to n

/fk:n - set the number of frame jumped over between successive displaying frames to n. The larger the value, the faster the animation will be run.

/fy:n - this is the synchronization percentage. This is a factor to minimize the difference between the capturing and displaying speed. A sync of 100% means the best match. A value of 0 means no synchronization is done. Value of greater than 100 will slow down the animation.

/v:m - select your VGA card chip set. The program normally will automatic detect your VGA type, but if there is any problem, try using this option to force the VGA mode or use the standard VGA mode.

5.3 Converting PPF (SWAPPPF.EXE)

The program SWAPPPF.exe will convert the PPF file to other popular file format such as PPF, PCX, TIFF, TARGA, GIF. You can convert a specific frame in a continuous capture PPF file, or convert all the frames to a format with the name of xxx001.xxx onwards. Just follow the instructions given in the program.

6. About Multimedia

6.1 What is MultiMedia?

Multimedia has been the hottest topic in the computer industry but unfortunately the definition of it is quite confused. To us, it is the integrated handling of more than one medium at a time. These media include the colour, graphics, animation, video and sound.

6.2 Why MultiMedia?

The traditional way of presentation with flip charts, overhead transparencies and reports has many problems such as long preparation time, clumsy equipment setup, less flexibility of modifying and updating in short period, etc. But the main drawback is that it usually cannot hold the audience's attention if the presentation is too long. However, using multimedia which can present information through more than one of the senses, you can speed and improve the understanding of your audience and can hold their attention.

For example, you can use a bright colour or blinking text to illustrate the important points, use a special sound effect to get him to look at the display. You can also add motion to your presentation by incorporate motion digital video. All this functions can be easily done using multimedia concept. Remember that your main goal in presentation is to convey your idea to your audience, multimedia can achieve the objective of not only conveying information effectively, but also holding the audience's attention long enough to understand the condition more fully.

Besides, multimedia presentation is more convenient and can have higher standard of performance and better audio and visual effect under only one platform to control all equipment.

6.3 Full-Motion Video

Computer generated graphics and animation is already used in many presentation. They are fine on their own, but digitised image add the impact of reality to a presentation. There are currently 2 methods of getting full-motion video into your presentation.

6.3.1 The Analog Approach

The easier method is using some external devices and an analog video source to overlay the live video on your computer. However, there is an disadvantage that your computer should have some control on your video equipment. For instance, you can use a computer-controllable LaserDisc Player which you can find and display any segment of the recorded material in a record or so. But to create your own LaserDisc requires substantial time and money and

the help of external service bureaus, this solution is not quite suitable. You may use a normal VCR instead but the seeking speed is much slower. Furthermore, tape duplication can have generation loss and will degrade after some period. The main drawbacks of such device is that the video has to be created and stored outside the computer and the clumsy connection between the computer and the AV equipment during presentation. This kind of device is only suitable when the price and the performance of the equipment becomes acceptable which is not the case now.

6.3.2 The Digital Approach

Some people believe that requiring an external device to supply moving video is the wrong approach. Having motion video processed by computer and stored on a hard disk (or CD-ROM) seems to make more sense. So devices has been developed to capture motion video to the hard disk. It gives you instant access to any segment and provide the ability to edit and rearrange the video materials. Furthermore, presentation can be done much simpler without connecting an AV equipment. Another advantage is that there will be no generation loss when the digitised video is duplicated for distribution as compared with normal tape. However, this approach still have 2 problems: space and speed.

When capturing full-size (640x480) and full motion video (30 fps), one second of digital video may take up to almost 10MB of storage. Even if this limitation can be solved using large storage media, there is still a limitation for the computer to display such large amount of data in one second. To solve such problems, we usually limit the size of the image (320x200), reducing the frame rate (10 fps) and trimming the number of colours (256 colours). In this way, each frame takes up only about 60K and each second takes up only 600K of data. Moreover, compression can be done on the digital video which reduce the file size even more. However, to record an 1 hour video still takes up a tremendous amount of space, so it is usually used for short segments of video, for combining with other graphics, text They are mainly for uses where total in-house control instant and easy access and editing are of primary consideration.

6.4 How to use motion digital video

6.4.1 Training and Education Presentation

Traditionally, special equipment is needed to connect video signal to computer and the connection of it usually requires a team of professionals. The setup time is long and changes are not easily done in a short period. However, with the introduction of digitize motion video, there is no need of any AV equipment in your presentation. Everything can be done using a single computer. Last minute changes can be easily done.

6.4.2 Photo Album and Motion Image DataBase

Image Database or Digital Photo Album has been widely used in the computer industry. In the past, only a single picture is displayed. Imagine that if the picture in your database can have motion, your idea can be expressed more clearly and efficiently. You can also setup a library of your video tapes, with a preview of it in your computer.

6.4.3 Video Teleconferencing

Digital Motion video can be sent through network easily and can make video teleconferencing as practical as using a phone.

6.4.4 Entertainment

Computer Games can now add real-life action easily with the help of motion video. It may bring a new dimension to the design, its reality and more fun.

7. Troubleshooting

This section explains how to handle problems which may be occurred after installation or during the usage of software.

Problem

After the installation of the card, the machine cannot be booted up or does not work properly.

Solution

This may due to 2 reasons

1. Your card is not seated properly in its slot. Turn off the computer and check that you have inserted the card properly.
2. Your card is conflicting with other cards in your computer. Try to change the jumper setting of your card (see Section on Jumper Setting).

If you still find problems, please contact your dealer or the nearest technical support.

Problem

When the program MRRG starts up, it shows a purple colour on the preview area instead of the live video.

Solution

You have not run the compatibility driver. Type 'RGDRV' to run it before you run the program or use the batch file runme.bat to run the program.

Problem

Video is not detected on starting and changing source

Solution

Check the connection of your video source.

8. Appendix

8.1 How to tune up performance of the Card

1. Use Single Field (Even is better) capture when capturing fast moving object. This will reduce the amount of smearing due to misalignment of the odd and even field video signal (You will never notice that the odd and even field differ so much on fast motion on a TV because the TV is running in an interlace mode, but on the computer monitor, you will notice as it is run in non-interlace mode) Both Field Capture can be used when the capture image is stationary.

2. Some computers intentionally add delays to bus cycles to cope with slow interface cards. However, MR RamGrab/AT is designed to work at faster than 8MHz bus clock and zero wait state access. If there is no problem for other interface cards, you can set your computer to run at turbo mode and minimum dummy cycles for bus accesses.

3. Picture files occupy a lot of disk space and it takes time to transfer these data. If your hard disk is not fast enough, you can install a RAM disk by putting the following command in your CONFIG.SYS file.

   DEVICE = [d:path] VDISK.SYS [size] [sector] [dir] [/E] [/A]

   For example : DEVICE = VDISK.SYS 400 256 72 /E

   installs a RAM disk of 400K bytes with 256 bytes per sector and 72 directory entries.

   Note: the minimum size is 400K bytes

   Once you have reset your computer, a RAM disk drive is created with the letter following the last drive you have. For example, if you have a C: and D: drives, the new RAM drive will be the E: drive.

   Next, you can add the following command line in the path statement of the AUTOEXEC.BAT file.

   COPY [drive:\directory] [RAM drive]

   The "drive:\directory" is the drive and directory which contains the file of the MR RamGrab/AT programs.

   After resetting the computer (or after running the AUTOEXEC.BAT file), you can then go to the RAM disk drive (e.g. E:) to run the grabber program. Because files are now saved in the RAM disk, it takes much shorter time to save the grabbed images to files.

   Use this RAM DRIVE to capture a series of frames, then copy the file to your hard disk. Since saving to the RAM DISK is much faster, the frame rate may be greatly increased. It is highly recommended to capture frames using such method.

4. You can tune up your hard disk by running a disk de-fragment program. Such program can clean up a continuous block of disk space which speeds up reading and writing.

5. Some hardware controller or SCSI hard disk have disk caches which buffers data to be transferred. Provided the disk is fast enough, application programs do not experience delay in writing to the disk. They are ideal for continuous capture of motion video. At 160x120 and 12.5 frames per second, each second of video requires 240K of disk space. A 300M hard disk is sufficient to store more than 20 minutes of motion video. Normally hard disk with IDE interface can transfer data at over 200k per second.

8.2 Plain Picture Format (PPF) documentation version 0

The plain picture format is defined by Display Research Laboratory to facilitate experimentation with colour video images. There is no encryption of pixel data and the components present in each pixel(s) is indicated in the header. Although its structure is simple, it already encompasses almost all possible pixel organisation found in memory mapped display cards used nowadays. The definition of fields for version 0 in the file is shown in the following entries in order.

Byte Offset	Size (bytes)	Field Name	Range	Default Values
0	1	PPF ID	—	40
1	1	Version	—	0
2	2	Width	1-65535	—
4	2	Height	1-65535	—
6	2	No of Frames	1-65535	—
8	2	Tempo (time/frame/sec)	0-65535	—
10	2	Reserved	—	0
12	1	Flags	—	0
13	2	Reserved	—	0
15	1	Components	—	1
16	1	C1	—	'I'
17	1	L1	—	8
18	14	C2..L8	—	0
32	96	Reserved	—	0
128	768	256 RGB palette entries	0-255	—
896	Wd*Hght	Pixel Data index	0-255	—

Notes:

1. All unused bits or bytes are reserved and should be set to zero.

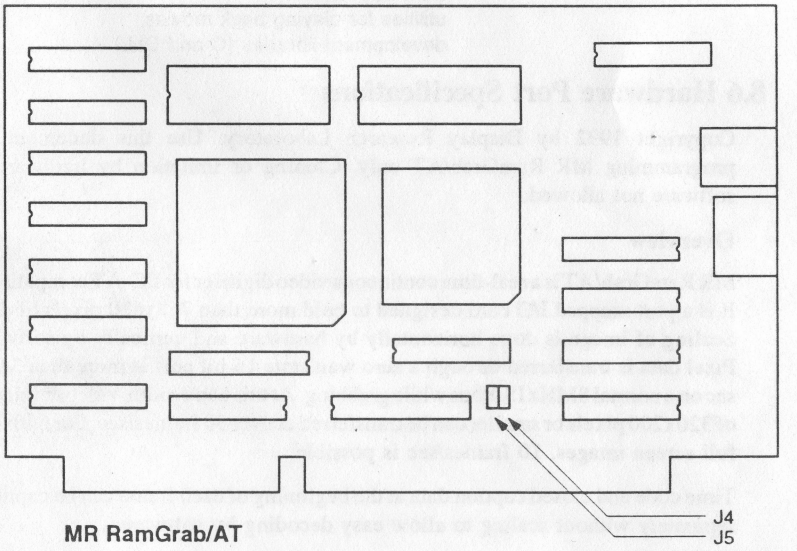
2. Tempo can be set to any values if the number of frames in the file is 1 so you may ignore the tempo in such case. You can use the tempo value to synchronise the difference between the time in capturing and displaying. If you don't mind the speed, just simply ignore them. Notice that Tempo can be set to zero even if the file contains more than one frame.

8.3 Jumper Setting and Port Base Address

In order that MR RamGrab/AT may work properly with other interface card. Jumpers is provided to select different port base address so that conflict is reduced to a minimum. There are four setting - 320H, 370H, 390H and 3E0H. The default factory setting is 3E0H. All programs use such default setting. If you change the jumper setting, you should run the program with parameters identifying that setting is changed (see the relevant software description). The relationship between the jumper and the base address is shown in the following table.

Jumper 4	Jumper 5	Port Base Address
Close	Close	320H
Open	Close	370H
Close	Open	390H
Open	Open	3E0H

8.4 Layout of MR RamGrab/AT



8.5 Specifications of MR RamGrab/AT

•Function	Video Colour Digitiser for AT Compatibles
•System Requirement	AT Compatibles Windows 3.0 or DOS 3.3 VGA Display Card with 512k RAM at least
•Video Input	Composite and S-Video, NTSC and PAL
•Resolution	256 gray, 256 colour, 16-bit and 24-bit colour
•Frame Memory	max. 720x620
•Operating Environment	Operating Temperature : 10-32°C Humidity : 15-85% Storage Temperature : 5-40°C
•Dimension/Weight	approx. 11cmx16cmx1cm/200g
•Power Consumption	1A normal
•Picture Saving Format	PCX,PPF,TARGA,TIFF,GIF
•Ordering Information	Order includes: MR RamGrab/AT MR RamGrab/AT User Manual Warranty Card
•Software Included	Windows 3.0 application DOS application utilities for playing back movies development libraries (C and DLL)

8.6 Hardware Port Specifications

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Overview

MR RamGrab/AT is a real-time continuous video digitiser for PC-AT compatibles. It is a port mapped I/O card designed to hold more than 768x620 pixels of data. Scaling of image is done horizontally by hardware and vertically by software. Pixel data is transferred through a zero wait state 16-bit port at more than 3MB/sec on a normal 8MHz ISA bus while grabbing. At this bandwidth, video animation of 320x200 pixels or smaller can be transferred at over 30 frames/sec. For 640x480 full screen images, 10 frames/sec is possible.

Time code and closed caption data at the beginning of each frame can be captured separately without scaling to allow easy decoding by software.

In addition to 8-bit grey and colour modes, this board also supports YUV component colour mode which can be translated to 16- or 24-bit pixels easily by software. Colour decoding is done by Philips video decoder chipset in YUV component values. Translation into grey and optimised 8-bit colour mode is done by our proprietary ASIC controller.

This document outlines low level control of the board. It is provided as is without further elaboration or additional technical support. More sensitive information is included in a more detailed document. Access to which requires signing of non-disclosure agreement.

Hardware port specification

The following table is a brief introduction of port map for MR RamGrab/AT:

PORT		NAME	DESCRIPTION
BASE+0	R	FRST	Reading this port resets 'GRABF bit' in port STATUS.
	W	SCALE	Specifies horizontal zoom scale from 1/256 to 256/256.
BASE+1	R	nu	Not used.
	W	FRAME	Frames (1-16) skipped between grabbing to frame buffer.
BASE+2	R	LUTDR	Read lookup table with auto-increment.
	W	LUTDW	Write lookup table with auto-increment.
BASE+3	R	nu	Not used.
	W	MODE	Operating mode port.
BASE+8	R	STATUS	Grabbing status port.
	W	I2BUSW	I2C bus write port. D0:data, D1:clock.
BASE+C	R	VDATA	Read video pixel data at load address with auto-increment.
	W	LOAD	Set frame buffer load address.

Remark:

The value of 'BASE'(base port address) can be set to 320,370,390 or 3E0 and the default setting of it is 3E0.

Port function description.

FRST

8-bits read port used to reset the 'GRABF bit' in port STATUS.

SCALE

D7	D6	D5	D4	D3	D2	D1	D0
SC7	SC6	SC5	SC4	SC3	SC2	SC1	SC0

This 8-bit write port specifies a horizontal fractional zoom scale which is :

scale = ([D7..0]+1)/256

At full scale, the current implementation gives 720 horizontal pixels in which the middle 704 pixels covers active video signal present in standard PAL and NTSC signals. 8 bits for this scaling factor allows shrinking of the image to a precision of 720/256 pixels or better than 0.4% of full scale. Scaling is done by selectively skipping pixels.

To obtain image of correct aspect ratio, the pixel number should be scaled from 704 to 640 for NTSC and 768 for PAL. Since it is not possible to specify a scale of bigger than one, aspect ratio of PAL images can be corrected by selectively skipping scanlines.

FRAME

8-bit write port used to specify number of frames to be skipped between each grabbing to frame buffer.

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	FD3	FD2	FD1	FD0

frames to skip = [D3..0]

LUTDR,LUTDW

8-bit read port used to write or read back the content of lookup table (LUT) pointed to by colour lookup table address pointer. Since the address pointer of LUT will increase automatically by one after accessing this port. The LUT can be easily filled or checked sequentially.

For grey mode, the brightness value forms the lower 8-bit of the LUT address. Hence, 256 write's to this port is required to specify the colour index used for each of the brightness level. The video circuit is designed such that the brightness value will range from 14(black) to 224(white) for a standard composite video signal. Values outside this range is possible due to deviation of signal from video standard and other sources of inaccuracy. A possible default lookup table is to output a value of 24 to LUTDW 14 times, then output 24 to 248 sequentially followed by a value of 248 for 32 times. The colour palette on the VGA display card is then set to contain a ramping grey colours from entry 24 to 248 or other pattern to reflect the current contrast, brightness, and gamma settings. Colour index entries 0 to 23 can be left to the system. Windows require entries 0 to 15 to properly display background windows and icons. Entries 249 to 255 can be used by the application program for whatever desired purpose.

For 8-bit colour mode, an encrypted colour code forms the 10 bits of the LUT address. hence, 1024 write's to this port is required. A default mapping is provided for you which makes the best use of colour indexes. The last 232 index values are used to cope with requirements of Windows with 8 additional indexes available for the program. You may re-map the index values to other ranges to suit your application. You can also merge index values giving up

very similar and seldom used colours to free up more entries in the colour palette.

For YUV mode, the lookup table should be filled sequentially from 0 to 255 which means no translation at all.

MODE

8-bit write port used to set the grabber into different operating modes such as 8-bits colour, gray, (16-bit colour) and Fill LUT mode.

D7	D6	D5	D4	D3	D2	D1	D0
X	ZERO	INTEN	TCEN	GREN	CMODE1	CMODE0	LUTRW

LUTRW is the Fill LUT enable bit. The colour lookup table pointer address is reset when this bit is 'LOW'. When it is 'HIGH', grabbing is not possible.

[CMODE1..0]

0 grey mode.

1 YUV colour mode.

2 8-bit colour mode.

TCEN is time code enable bit. A 1 prevents the first 21 scanlines of each frame from scaling. Hence, time code and closed caption data is grabbed at the largest scale for easy software decoding.

INTEN is interrupt enable bit. A 1 enables interrupt signal to the bus when GRABF is high.

GREN is grab enable bit. A 1 enables writing to the frame buffer. Enabling and disabling takes effect beginning from the next frame.

ZERO must be set to 0.

I2BUSW

8-bit write port to generate I2C bus data and serial clock in order to configure digital colour decoder.

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	X	X	SCL	SDAO

SDAO stands for I2Cbus serial data.

SCL stands for I2Cbus serial clock.

STATUS

8-bit read port to indicate the status of grabber.

D7	D6	D5	D4	D3	D2	D1	D0
X	X	X	X	SDAID	VS	HREF	GRABF

GRABF is set when a field of video image is captured.

HREF is the negative horizontal blanking signal.

VS is the positive vertical synchronization signal.

*SDAID is valid only when the bit SCL is HIGH.

LOAD

16-bit write port used to set the grabber frame buffer read address.

D7	D6	D5	D4	D3	D2	D1	D0
RA9	RA8	RA7	RA6	RA5	RA4	RA3	RA2

D15	D14	D13	D12	D11	D10	D9	D8
RA17	RA16	RA15	RA14	RA13	RA12	RA11	RA10

[RA17..0] is the word address pointer on the onboard frame buffer. Owing to the limitation of 16-bit port, RA0 and RA1 are set to zero. 0 to 3 dummy reads to VDATA can be used to set it to any desired value.

The load address for the beginning of the nth grabbed scanline is nx96.

VDATA

16-bit auto-increment read port used to read local memory data(16-bits) at the LOAD address.

For 8-bit grey and colour mode, each word read represents 2 adjacent pixels. Low byte is the left pixel value and high byte is the right pixel value. This ordering is consistent with Intel memory addressing and VGA pixel ordering. Therefore, 8-bit pixels can be moved to memory or VGA display card without byte swapping. The assigment of 8-bit values can be set by the on board colour looking table to match the colour setting of the display card's colour palette.

For YUV mode, pixel data is encoded in a non-displayable format. Library routines are provided to perform YUV to RGB translation on non-disclosure basis.

About I2Cbus

Specifications for the I2C Bus is available from Philips. 8Ah is used as the master address of I2Cbus. Library routines are available to access this bus.

The video decoder used in the grabber should be configiured through the I2C BUS to the correct set of parameters according to video standards. It is also used to select NTSC and PAL signal and also the input selection between different sources (S-VHS, Composite). I2C Bus must be configured before any grabbing is done.

The following are typical values for normal operation

SubAddress	Function	Default Value (Hex)
00	Inc. delay	5E
01	HSY start	37
02	HSY stop	07
03	HC start	F6
04	HC stop	C7
05	HS start	FF
06	H-peaking	50 = NTSC Composite 12 = NTSC S-video 40 = PAL Composite 02 = PAL S-video
07	HUE control	00
08	control 1	38 = PAL- B,G,H decode 77 = NTSC-M decode
09	control 2	E3
0A	control 3	20 = S-VHS input 08 = Composite input
0B	SECAM delay	00

After the data is sent, it is no longer needed to reconfigure the video decoder unless you want to change the input select (0A) or PAL/NTSC decode (08). You only need to send that subaddress and data to the bus instead of the whole block. i.e. After configuring the I2Bus, if you want to reselect the input signal as a PAL signal, you only need to send subaddress 08 and data 38 to the I2Bus Configuration routine. Normally other subaddress value need not be changed once configured.

8.7 MR RamGrab/AT C Libraries

Guide to Programming Version 1.0

8.7.1 Introduction

This document describe how the C library routines can be used for your own development. This routines are compiled using Turbo C. But since most of the routines include the source code, you can easily modify them for your own compiler.

Since the hardware is so powerful minimal programming is required to handle them. What you need to do is to initialize the hardware to the correct status and use a routine to dump data to a buffer. This buffer can be the screen memory buffer or any other memory location for later transfer to the hard disk.

8.7.2 Program Flow

The program flow can be divided into several steps - initialization, default setting configuration and getting video data. Usually a program will start with the initialization step and setting configuration, followed by the looping of getting the video data. If any setting such as source selection, color mode changing etc., need to be modified, the setting configuration step is used again. The following are the steps listed in order of appearance in a typical program.

8.7.2.1 I2Bus Initialization

This step prepares the hardware for the grabbing process. You should run the compatibility driver (if any) before doing the initialization step, otherwise, unexpected error may occur. In this step, you should first initialise the I2Bus in the hardware by using the routine **rgInitializeI2Bus**.

8.7.2.2 Configuration of Signal Source and Standard

The next step is to select either S-Video or Composite source using the routine **rgSelectSource** and detect if there is video in this source through the routine **rgDetectSignalSync**. If no signal is detected, try another source. Otherwise, use routine **rgDetectSignalStd** to determine whether it is NTSC or PAL.

8.7.2.3 Setting up of Color Palette and LUT

Next, set up the lookup table on MR RamGrab using the routine **rgSetLUT** to your chosen color mode. This determines how the video data is represented. You may get the palette for your display card with the routine **rgGetPltt** and set this return palette to your video display card. Then you may set the chosen color mode to your hard disk with the routine **rgColorPlayThru**. To change the color setting such as brightness, contrast and saturation, just pass the parameters to the routine and get the new palette. Hue can be set using hardware routine **rgSetHue**.

8.7.2.4 Scale Factor Determination

Scale Factor determines how large a full video image will be digitised to. Horizontal shrinking is done by hardware using the value of horizontal scale. This scale can be made known to the hardware through the routine **rgSetHscale**. Vertical shrinking is done by software in the grabbing routine. The values of horizontal scale and the vertical scale can be calculated using the routine **rgFindScale**.

8.7.2.5 Frame Skip Count Setting

Frame Skip Count is used by the hardware to determine how fast it will capture frame. A frame skip count of zero means that the hardware will update its RAM for every frame (i.e. capture every frame). A value of one means every other frame and so on. Since the transfer of one frame to the hard disk usually need more than one frame time (1/25 sec for NTSC and 1/30 sec for PAL), so setting of frame skip count to a larger value ensures that a whole frame is captured to the hard disk. If the count is too small, the frame in the RAM will be overwritten by the next frame before it is transferred to the hard disk. Usually, a smaller frame (about 160x120) can have a frame count of zero or one, while 640x480 may need a frame count of five. Notice that this restriction applied only to the live video preview and continuous capture case. For individual frame capture, since you may pause the hardware grabbing (use the routine **rgSetColorPlayThru** to disable the play through status), it is not necessary to modify the frame count to capture a large frame. Frame Skip Count can be set using the routine **rgSetFrameCount**.

8.7.2.6 Set up Grabbing Parameters

Several parameters are needed to specify the grabbing area, methods for the grabbing routine **rgGrabOneFrame**. In the **rgParamBlk**, you should provide the following parameters to the routine - lskip, wskip, lxfer, wxfer, hscale, vscale, videoSgnFldFlag, videoSyncFlag. Lskip is the number of SCANLINES skipped from the top of the video image. Wskip is the number of double pixels (words) skipped from the left of the video image. It should be noticed that the parameter wskip is a value after scaling i.e. the same value will skip different percentage of a scanline in different horizontal scale (since horizontal shrinking is done by hardware) while the parameter lskip is the same for all scale (this shrinking is done by software and is adjusted already in the assembly routine). Lxfer is the number of lines grabbed (height of image) and wxfer is the number of double pixels grabbed (half width of image). Hscale and vscale are the horizontal scale and vertical scale respectively which has been described in previous paragraph. VideoSgnFldFlag tells the routine to capture single field data instead of all the two fields. VideoSyncFlag is a flag to tell if the transferring frame should be synchronised on start first. This flag may be useful in preview mode as this prevents tearing of the image. However, on still frame capture,

since the hardware has paused grabbing, it must not be sychronised since there is no sync (You should be careful not to set the sync flag while the hardware is not grabbing, otherwise, there will be an internal infinite looping in the routine).

8.7.2.7 Getting Video Data

Use the routine **rgGrabOneFrame** to get video data to your specified memory location. If your specified location is the screen address, it is the preview mode. You can also specify a buffer to hold the data to transfer them to hard disk later. The data return may have different foramt in different color mode. In 256 gray mode and 256 color mode, each data is the index for each pixel. In true color mode, the data are in the sequence YUYV so one should translate them back to RGB first. The routine is only capable of capturing a block of 64000 data at a time. For image of size larger than 64k, one should call the routine a number of times with different lskip and merge each chunk of data to get a larger one. This part may be looped to get the live video on screen.

MR RamGrab/AT

Version 1.2

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